- 2 set forth in SEQ ID NO:1, or its complementary strand.
- 1 2. The purified and isolated DNA molecule of Claim 1, wherein said DNA molecule
- 2 encodes for a purified and isolated protein molecule consisting essentially of the amino acid
- 3 sequence set forth in SEQ ID NO:2.
- 1 3. A live, attenuated strain of *V. anguillarum* which comprises:
- a mutated *mugA* gene, the strain characterized in that it is incapable of expressing a functional *mugA* protein.
  - 4. The live, attenuated strain according to claim 3 wherein the strain is incapable of growing in salmon intestinal mucus.
  - 5. The live, attenuated strain according to claim 3 wherein the mutation is non-revertible.
  - 6. The live, attenuated strain according to claim 4 wherein the mutation is an insertion.
- The live, attenuated strain according to claim 4 wherein the mutation is a deletion.
- 8. A vaccine strain against *V. anguillarum* infection in an animal comprising:
- a live, attenuated strain of *V.anguillarum*, the strain comprised of a mutated mugA gene,
- 3 the strain characterized in that it is incapable of expressing a functional mugA protein.
- 1 9. The vaccine strain according to claim 8 wherein the strain further comprises a
- 2 pharmaceutically acceptable carrier.

- 1 10. The vaccine strain according to claim 8 wherein the animal is a fish.
- 1 11. The vaccine strain according to claim 8 wherein the animal is a bivalve.
- 1 12. The vaccine strain according to claim 8 wherein the animal is a crustacean.
- 1 13. The vaccine strain according to claim 8 wherein the mutation is non-revertible.
- 1 14. The vaccine strain according to claim 13 wherein the mutation is an insertion.
  - 15. The vaccine strain according to claim 13 wherein the mutation is a deletion.
  - 16. A method for immunizing an animal against *V. anguillarum* infection in an animal which comprises:

administering to the animal a vaccine comprised of a live, attenuated strain of *V.anguillarum*, the strain comprised of a mutated *mugA* gene, the strain characterized in that it is incapable of expressing a functional *mugA* protein as a result of the mutation in the *mugA* gene.

- 1 17. The method according to claim 16 wherein administering comprises immersion.
- 1 18. The method according to claim 16 wherein administering comprises intraperitoneal
- 2 injection.
- 1 19. The method according to claim 16 wherein administering comprises oral intubation.
- 2 20. The method according to claim 16 wherein administering comprises anal intubation.

- 1 21. The method according to claim 16 wherein administering comprising immersing the
- 2 animal in a medium containing the attenuated strain.
- 1 22. The method according to claim 16 wherein the animal is a fish.
- 1 23. The method according to claim 16 wherein the animal is a bivalve.
- 1 24. The method according to claim 16 wherein the animal is a crustacean.
- The method according to claim 16 wherein the mutation in the *mugA* gene *is* non-revertible.
  - 26. The method according to claim 25 wherein the mutation in the mugA gene is an insertion.
  - 27. The method according to claim 25 wherein the mutation in the mugA gene is a deletion.
  - 28. A method of inducing an immune response in an animal against one or more pathogens
  - which comprises transforming a live, attenuated strain of V. anguillarum, the strain characterized
- 3 in that it is incapable of expressing a functional mugA protein, with a plasmid comprising DNA
- 4 of interest encoding at least one protein antigen for each of the pathogens and administering the
- 5 transformed strain to an animal.
- 1 29. A method for the detection of the presence of V. anguillarum in animal tissue or fluids
- 2 comprising:
- contacting the sample with a detectably labeled DNA probe wherein the probe comprises
- 4 a detectable single-stranded DNA having a nucleotide sequence which specifically and

- 5 selectively hybridizes with DNA of V. anguillarum, the DNA probe comprising a nucleotide
- 6 sequence selected from the group consisting of SEQ ID NO. 1, whereby the presence of the
- 7 DNA is indicative of a *V. anguillarum* infection.